STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

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Dirk Kempthorne, Governor
C. Stephen Allred, Director

June 26, 2002

Ms. Kathleen Hain, Manager
Environmental Restoration Program
Idaho Operations Office
Department of Energy
850 Energy Drive
Idaho Falls, Idaho 83401-1563

RE: Waste Area Group 7 Operable Unit 7-13/14 Pre-Draft Remedial Investigation and Baseline Risk Assessment

Dear Ms. Hain:

The Department of Environmental Quality (DEQ) has completed its review of the above-referenced document and provides the enclosed comments. Both general and specific comments are provided. DEQ received the report on April 30, 2002.

We look forward to working with your staff to address these concerns during the comment resolution period. If you have any questions regarding these remarks, please contact me at (208) 373-0285.

Sincerely,

Dean Nygard
Remediation Program Manager
Waste Management & Remediation Division

Enclosure

cc: Rick Poeton, EPA Region 10
Daryl Koch, DEQ-WM&RD
Gerry Winter, DEQ-TS
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TRANSMITTAL COVER SHEET

FAX NUMBER (208) 373-0154
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DATE: 6/26/02

TO: Katie Hain
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TOTAL NUMBER OF PAGES (INCLUDING THIS COVER SHEET): 26

COMMENTS: WAG 7/13-14 Comments

GENERAL COMMENTS

1) The provisions of 10 CFR 61 are applicable to the shallow disposal of low-level radioactive waste, and 40 CFR 191 is applicable to the disposal of spent nuclear fuel or high-level or transuranic radioactive wastes. These waste types are present in the SDA; therefore these requirements are relevant and appropriate requirements for the purposes of remedy evaluation and selection. Absent from the risk assessment is an evaluation of the intruder scenario necessary under these requirements. DOE needs to complete this evaluation consistent with these requirements in the baseline risk assessment.

2) The Remedial Investigation and Baseline Risk Assessment concludes that there is an unacceptable risk to the Snake River Plain Aquifer posed by the waste disposed of at the Subsurface Disposal Area (SDA). The analysis of risk posed by the contaminants that have been disposed of in the SDA results in a predicted cumulative risk of 6.7×10^{-3} for the following isotopes: Ac-227, C-14, Cl-36, I-129, Np-237, Pa-231, Pb-210, Tc-99, Th-229, Th-230, U-233, U-234, U-235, U-236, U-238 (listed in Table 6-6, page 6-26) for the ground water pathway. Section 5.5 (pages 5-142–146) discussed changes that have been made between the modeling presented in the *Interim Risk Assessment* and this *Pre-Draft RI/BRA* and perceived uncertainties associated with the current effort. As noted on page 5-145, data are lacking for model calibration (source-release and subsurface flow and transport models). Additional data collection, laboratory studies, and model calibration for both source release and subsurface flow and transport might alter the final predicted cumulative risk or individual risk drivers. The cumulative effect of these efforts would probably not result in a cumulative risk that is within the acceptable range, therefore DOE needs to direct efforts toward the development of Remedial Action Objectives (RAOs) and remedial action alternatives.

3) Ecological Comments:

The Flora and Fauna Section 2.4 could be substantially built up by providing information on species present at the INEEL. Please include information such as general natural vegetation characteristics, community compositions, and the names of various mammals, birds and reptiles that frequent the INEEL, and lists of species of concern. These details come out later in subsequent sections, so are not lacking from the document; however, section 2.4 provides little information as a starting point.

We agree with the selection of a diverse group of receptors for the ecological risk assessment. However, it appears that mammals and birds predominate throughout

the section and there is not enough recognition of the insects and plants. Although they are accounted for as pathways, they are not recognized as receptors in their own right. Harvester ants are known for their burrowing activities and the potential that holds for transporting contaminants. However, there are perhaps 40 species of ants on the INEEL, some of them possibly rare. Other insects have the potential to be exposed to contaminants as well. For example, carrion beetles will be exposed to contaminated rodents when they bury and feed on them. Additionally, although the plant community is simple and controlled at the moment, it will change through time. This will increase the likelihood of rare plants becoming exposed to the contaminants as they re-colonize the area.

Although Baseline Risk Assessment demonstrated that there is a risk to avian and mammal herbivores and carnivores, DEQ believes there is also a risk, perhaps even greater risk, to the organisms that these groups are eating. Plants, insects, and insectivores should be included in the list of receptors.

4) The remedial investigation needs to include a discussion on the delineation of areas according to waste types and concentrations for the purposes of subjecting one form of remedial alternative to a certain area, and examining if another area may be more suited to another kind of treatment.

4) This document is a pre-draft version of the remedial investigation and baseline
5) risk assessment that is due on August 31, 2005. The Feasibility Study is due December of 2005. These deadlines leave DOE with approximately three years to address Agency concerns with this draft and develop RAOs that form the basis for development of remedial alternatives. The following will need to be completed during this time period for an acceptable Remedial Investigation and Feasibility Study to be submitted to the Agencies:

- Incorporate findings from the Pit 9 Retrieval Demonstration Project that will aid in a complete evaluation of waste retrieval in the Feasibility Study. Information and data learned from Pit 9 should also be used to validate relevant assumptions made in the Remedial Investigation.

- Continuation of the grout treatability study to address the implementability and effectiveness of this remedial alternative on waste forms present in the SDA. To date DOE has yet to conduct any evaluation of this remedial approach.

- Evaluations of other treatment options that will address the RAOs that need to be developed for the SDA.

- Current sampling and analysis from the vadose zone has shown an increase in the amount of contaminants of concern (COCs) detected. Groundwater sampling has also detected COCs at various concentrations, although in some

instances the results are too sporadic for trend analysis. Determine specific actions that can be taken to address the current data indicating these potential trends in vadose zone and groundwater sampling results. The COCs that have moved into the vadose zone should be prevented from reaching the Snake River Plain Aquifer (SRPA). It is important to identify the mechanisms responsible for transport from the waste zone and be able to identify and evaluate potential treatability studies that will identify remedies that can limit contaminant migration.

- COCs have been detected in the groundwater upgradient of the SDA. One possible explanation for this anomaly is infiltration from the nearby spreading areas and the Big Lost River. Additional tracer testing of the spreading areas and Big Lost River should be performed.

- The test plan to measure adsorption of actinides on interbed materials from the RWMC was never performed. The purpose of the study was to develop geochemical parameters for a defensible reactive transport model of contaminant migration at the SDA. The primary objectives of the study were to characterize spatial variation in adsorption parameters in interbeds and to determine the effects of variations in vadose zone water chemistry on adsorption. The proposed test should be implemented so that the adsorption and desorption partition coefficients can be developed to determine the distribution coefficient for a given range of solution concentrations. These sorption parameters can then be used in the transport modeling of contaminants. K_d values can then be incorporated into the model.

- Geochemical monitoring data such as major cation and anion analysis should be used to assess species that influence contaminant release and transport. Initial planning included the use of geochemical probes to monitor pH, oxidation-reduction potential, and temperature in the subsurface of the SDA. It was later reported that these particular probes were only usable under saturated conditions and had a very limited lifetime. Further investigation into other methods to obtain the needed data should be examined.

- Relative to the aquifer flow model calibration in the report, the flatness of the water table coupled with an apparent low permeability region to the south-southwest of the SDA precludes accurate determination of groundwater flow directions. It is recommended that existing isobaric wells at the SDA be used to accurately measure water levels to improve the state of the knowledge regarding directions of groundwater flow.

- Determine how long it takes water to travel to the aquifer from the SDA surface to confirm simulation results and to match current concentrations of contaminants found in vadose zone and groundwater (continue to monitor for magnesium chloride, tracers, etc.) Continued monitoring and interpretation of

ongoing tracer testing within the aquifer is necessary to improve understanding of the extent and influence of the low-permeability zone. It is important to know how much of the contamination has left the source area, and when and if it will impact the SRPA. Remedial decision making will depend on this type of data.

- Continue to compare sampling results with the simulation results from modeling.

- The monitoring network has been greatly expanded since 1998 with 22 vadose zone lysimeters, 4 upgradient wells, an aquifer well inside the SDA and Type A and B probes in the buried waste. Analyte target lists have been modified to focus on those contaminants that may be migrating. Contaminants that pose an unacceptable risk have been identified as a priority, especially for vadose zone samples where sample volumes are consistently small. Most of these changes have not been in place long enough to provide data to refine the understanding of the contaminant distribution or trends. It is important to continue this work for assessing source release into the vadose zone, contaminant migration through the vadose zone, and potential impacts to the aquifer beneath the SDA. Include interpretation of spatial and temporal patterns. This fieldwork will assist in model calibration and the selection of RAOs.

- Waste inventory information is uncertain and incomplete. Early disposal operations from 1952 to 1959 did not require a disposal documentation form. Trench location is also noted as a problem. Originally, trench locations were identified and recorded with metal tags placed at regular intervals along the barbed-wire enclosure that surrounded the landfill. This procedure was discontinued in the late 1950s, and concrete survey monuments were placed at the ends of each trench. The older disposal sites were retrofitted with monuments, but the accuracy is uncertain. From 1960 until commercial burial sites became available in 1963, the NRTS accepted approved shipments from off-site generators. In the late 1960s and early 1970s, five buried waste retrievals were attempted. Pit 10 was entered with the intent of retrieving Drum No. 771-3431. Though disposal records indicated Pit 10 received this drum, neither Drum No. 771-3431 nor any other drum from the same load was found in Pit 10. These are but a few of the examples cited in the Pre-draft RI/BRA that prove there are many uncertainties with the inventory information. The information obtained from the recent Rocky Flats visit should be used to check the data in the Waste-O-Scope and CIDRA.

- Obtain additional characterization data from within, beneath, and adjacent to the buried waste to adequately calibrate the source term and fate and transport models.

- Continue additional environmental sampling and monitoring data from the vadose zone and the deep vadose zone to assess the nature and extent of contamination and calibrate fate and transport models, such as:

- Identify preferential or "fast" pathways through the interbed regions.

- Take interbed samples to measure hydrologic and transport properties. Spatially variable K_ds are not identified in the current Pre-draft RI (it may be worth resurrecting the batch tests that were proposed earlier, they still might have some added value).

- Continue advanced tensiometer monitoring (hopefully capturing a large-scale infiltration event) to augment, confirm, or change the current conceptual model of water transport in the unsaturated zone.

- The report states that suction lysimeters with porous stainless steel cups were installed in 1999 and 2000. Since there are no results from these lysimeters in this version of the report, it would be important to continue to monitor them, and to report the results in the next version of the RI/BRA. Of particular interest are the lysimeters in the B-C and C-D interbeds, since there are many data gaps in these regions.

- The report states that the nuclear logging data interpretation was performed too late for incorporation into the Pre-draft RI/BRA. Interpretation of the nuclear logging data generated from the Type A probes should be a priority for the next report.

- To better define the nature and extent of contamination along with fate and transport, it will be necessary to continue monitoring of the Type B probes and provide the necessary follow-up data (including placement of new probes if required). RAOs will be developed that depend on site-specific data for actinide migration rates to improve predictive modeling results. There are far too many instances where the model does not replicate actinide concentrations in the vadose zone and groundwater.

- Several Type B probe vapor ports have been installed at the SDA including SVR-20. As of March 2002, several sets of soil vapor samples have been collected for C-14 analysis as part of method development for long-term C-14 monitoring. DEQ agrees that if these results show C-14 concentrations, samples should be collected from the older gas ports to be evaluated and compared with the desiccant method.

- C-14 has been selected as a risk driver. The amount of C-14 disposed of and the release rate is uncertain. An effort is ongoing to refine the inventory of C-

14 in the SDA. Testing to determine C-14 venting to the atmosphere would be helpful in evaluating release rates to the different media.

- There have been laboratory tests involving ethylenediaminetetraacetic acid (EDTA) in order to determine the effects of organic complexing agents on the mobility of actinides. Little is known involving the synergetic effect of all the different organic complexing agents that are presently in the SDA. One scenario may involve an enhanced mobility of the actinides that are exposed to this "organic soup." It is recommended that actinide mobility be tested utilizing agents that better simulate the distribution of organic compounds in the SDA.

- Further work to better define the inventory and release rates for C-14 and Tc-99 would improve the risk assessment results. Both of these are now being detected in the quarterly sampling and analysis reports.

- Obtain data to determine if the aquifer tritium plume is attributable to the SDA, TRA, or INTEC.

- Results indicate cores recovered from inside the SDA contained Ra-226 above the background concentrations. Lysimeter and groundwater sample results do not corroborate Ra-226 presence in the vadose zone core samples. Whether the Ra-226 measured in the vadose zone core samples is attributable to Ra-226 or to interference from U-235 is uncertain. Currently sample data are "J" flagged, indicating the uncertainty and bias associated with the results, and the influence of the U-235 on the Ra-226 data is indeterminate. It is suggested that modifications be implemented for analyzing Ra-226 to improve confidence in analytical results. Use of alpha spectrometry or by measuring the equilibrated daughters with gamma spectrometry should improve the results.

- Some significant trends have been identified. In the aquifer around the RWMC, carbon tetrachloride has been identified above MCLs, nitrate levels in the southeast corner of the SDA (M6S) are steadily increasing, and low concentrations of C-14 are reported. In addition, low concentrations of C-14, Tc-99, Am-241, uranium and plutonium have been detected at low levels in the aquifer, suggesting that migration from the waste zone has already begun. The highest density of detections appears to be located above the B-C interbed in the vadose zone; however, some contaminants have been detected at the C-D interbed, and carbon tetrachloride extends to the aquifer. Provide information on interim remedial actions that would inhibit the mobile contaminants buried in the SDA from migrating further from the source area.

- The baseline risk assessment should be completed for the site in its current condition, and not assume that a cap will be placed on it sometime in the

future. The capping assumption also does not take into effect the risk that occurs between now and the time that a cap is finally constructed over the SDA. It is premature to suggest that a cap will be part of the final remedy.

SPECIFIC COMMENTS

1. Executive Summary, Page xii Nature and Extent of Contamination, Last Paragraph

Statements regarding how the expanded monitoring network will be used to provide data for assessing source release, migration and impacts to the aquifer should be included. This can be addressed by stating if these efforts will be addressed in an upcoming work plan.

2. Executive Summary, Page xii, Contaminant Fate and Transport, Second Paragraph

Provide reasons why chemical degradation was not assessed. Some chemical degradation by-products are harmful to human health and the environment. For example carbon tetrachloride can be degraded under anaerobic conditions via three different pathways. No enzyme is involved in these pathways; rather, reactions are catalyzed by cofactors present in microorganisms. One pathway is a sequential two-electron reduction process. Carbon tetrachloride is degraded to chloroform, dichoromethane (methylene chloride), chloromethane, and ultimately methane by hydrogenolytic dechlorinations.

3. Executive Summary, Page xiii, Contaminant Fate and Transport, Fourth Paragraph

Provide information on a plan to provide the monitoring data that is necessary to increase the number of calibration targets for the model.

4. Executive Summary, Page xvi, Ecological Risk Assessment

Explain how the "no action" scenario in the FS will be addressed if the fundamental assumption that the SDA will be covered with a cap is carried through the RI/FS process.

5. Executive Summary, Table 7-2, Page xvii

This table appears to be mislabeled; please correct to Table E-2.

6. Section 2.1, Page 2-2, Third Paragraph

According to Figure 1-1, the Little Lost River is also a surface water feature on the INEEL.

7. Section 2.2.2.4, Page 2-8, Third Paragraph

Based on field experience, it appears that the units in the statement regarding the diameter and height of dust devils have been transposed. Please verify the dimensions from the citations noted.

8. Section 2.2.2.4, Page 2-15, Surface Hydrology, Paragraph 7

The first sentence is somewhat confusing. If the Big Lost River is at an elevation that is "higher" than the SDA, how can it therefore pose no flood threat? The northeast flow away from the SDA by itself does not preclude potential flooding, however the topography between the river and the SDA does provide an obstacle. Please rewrite the sentence.

9. Section 2.3.1, Page 2-27, Second Paragraph

The paragraph states that monitoring of the NAT network ended in August 1996. A reason is not presented for this termination of data collection nor is an evaluation report cited. Data collected from the NAT network should be evaluated and presented in a report that can be cited. At that time, the agencies should evaluate the need for further monitoring and evaluation of data from the NAT network to better understand infiltration effects at the RWMC.

10. Section 2.3.3, Page 2-33, First Paragraph

This paragraph describes the material-of-construction and purpose of the suction lysimeters at the RWMC. The text also mentions an attempt to utilize the Teflon samplers in place of the ceramic cups because of the legitimate concern of constituent absorption and the low-detection bias of the collected fluid. "Teflon samplers" was the term used in the text. It is unclear in the text that these are Teflon cups, or another design, until Table 2-5 on page 2-35. Please add "cups" to the text to clarify. Also, since the text discusses the fact that the Teflon-design did not work, please describe the future of these four units; whether any thought has been given to replacing the Teflon units with stainless steel (since the ceramic cups are already suspect). If this effort is not cost-effective, please state this in the text. In reviewing the relative depths of the four (Teflon) suction lysimeters, they appear to be relatively shallow and accessible.

11. Section, 2.3.3, Page 2-38, Last Paragraph, Last Sentence

Please summarize the results from the sample obtained from deeper lysimeter L41 (analyzed for chloride, C-14, and tritium).

12. Section 2.3.5, Page 2-42, Figure 2-17

Since this Figure may be isolated from the balance of the text (and the following Figure 2-18), please indicate the relative direction/orientation of the RWMC to the three facilities contained on the Figure. This will clarify the RWMC location to the reader.

13. Section 2.3.5.3, Page 2-46, Figure 2-20

Same comment as above applies to Figure 2-17.

14. Section 2.3.5.2, Page 2-44, Last Paragraph, Last Sentence

It is stated that analysis for sulfate in wells located at the RWMC could aid in the determination of the impact of TRA on contaminant concentrations in the aquifer near the RWMC. This is a good suggestion. Please affirm if this is currently being accomplished.

15. Section 2.3.5.4, Page 2-47, First Paragraph

The text suggests that the SRPA beneath the RWMC is not being influenced by the contaminants introduced into the aquifer by the other facilities. The text also suggests a very worthwhile groundwater sampling effort to verify the status of this scenario. Please describe the wells that would be sampled within the scope of this program, the parameters selected (if more than I-129) and the timing of this worthwhile effort. Explain how this effort would provide value to the remedial investigation and subsequent remedy selection for the SDA.

16. Section 2.6.2, Page 2-53, Last Paragraph, Third Sentence

The statement is again made that a cap will be built over the SDA. Currently the cap is still only an assumption and not a certainty. The remedy for the RWMC has not been selected. The reference to capping should be checked throughout the document (see the general comment regarding cap assumptions).

17. Section 2.7.1, Page 2-53, First Paragraph

It should be mentioned in this overview section that DOE does consult with the Idaho State Historic Preservation Office for issues regarding cultural resource management.

18. Section 3, Page 3-1, First Paragraph, Last Sentence and First Bullet

Please check sentence/bullet structure, both appear to be truncated.

19. Section 3, Page 3-5, Bullet 1

Please edit the sentence as needed for verb tense.

20. Section 3.1.1, Page 3-5, Third Paragraph, Fourth Sentence

The text in this description of the four-step screening process mentions a third step in which these buildings/structures were "operated with appropriate controls". The same

concept is alluded to in the fourth step, which follows. Because the definition of the word "appropriate" is subjective and could be subject to reinterpretation with time, the document should clarify what this term means. Please describe how the authors intended to interpret "appropriate" when describing "controls" and whether this was a value determination by the authors, or what the operators of the buildings/structures at the time deemed "appropriate" based upon the guidance/body of knowledge available.

21. Section 3.1.2.2, Page 3-7, First Paragraph

For the three year period from 1960 until 1963 provide what information is known regarding the amount and type of waste accepted from off-Site generators.

22. Section 3.1.2.3, Page 3-7, Second Paragraph

Please state whether or not it is known which trenches were compacted by dropping a heavy steel plate on the waste.

23. Section 3.1.2.3, Page 3-8, Last Paragraph

Please summarize the results that were obtained from the water samples collected and analyzed from the subsurface monitoring holes and field investigations.

24. Section 3.1.2.4.2, Page 3-9, Third Paragraph, Second Last Sentence

The text states that a "geotextile liner" was incorporated into the underburden in the bottom of the pit in 1985. Please verify if this was geotextile liner or geomembrane liner in this specific application.

25. Section 3.1.3.1, Page 3-10, Second Paragraph

The text states that waste acceptance criteria are established for the SDA. Exceptions to the waste acceptance criteria, like most operations, can be obtained from DOE as long as RWMC limitations would not be exceeded. Please provide examples of the types of wastes that would require this special approval, the criteria that are typically exceeded, and the frequency of these exceptions.

26. Section 3.1.3.1.1, Page 3-10, First Paragraph

The text succinctly describes the construction features of Pits 17-20. Please provide additional detail regarding the types of soil, compaction efforts, drainage features, etc. for these active Units.

27. Section 3.1.3.1.1, Page 3-11, Last Sentence

Use of the phrase "sod-building grass" for the cover over the pits seems inappropriate for the reality of the situation. The document should use a phrase that better reflects future vegetation conditions.

28. Section 3.1.4, Page 3-13, Third Bullet

Please provide information regarding how many of the 20,262 retrieved drums went to the TSA and how many went to the Transuranic Disposal Area (Pad A).

29. Section 3.1.4.1, Page 3-15, First Paragraph

Since the written information regarding Pit 1 retrieval is sparse, provide information regarding attempts to conduct personnel interviews with workers that were at the SDA during this time period.

30. Section 3.1.4.3, Page 3-18, Second Paragraph, Last Sentence

The leaking free liquid is stated as being uncontaminated though contamination levels up to 40,000 cpm were found in some of the liquids. Please state whether any of the liquids were further analyzed for other contaminants and the results, if known.

31. Section 3.1.4.4.2, Page 3-20, Second Last Paragraph

Please state if an effort has been made or is planned to correlate data from WasteOScope with the locations of the drums found during retrieval efforts. This would be another way to check the accuracy of the database for location information.

32. Table 3-6, Page 3-38, Last Paragraph

According to the previous description and summary of OU 7-09, it was initially deferred to the 7-14 comprehensive RI/FS, but this has been delayed until the TSA facility is closed. This OU should also be added to the exception of OUs 7-02 and 7-11.

33. Section 3.2.1, Page 3-38, Third Paragraph, Last Sentence

Please provide a basis for stating that "most soil vaults have at least 1.8 m (6 feet) of cover since, on the following page, this parameter/assumption was utilized in the MICROSHIELD computer code for exposure modeling. Unless a sound basis for using this depth of cover can be provided, a much more conservative input assumption should be utilized (see First Paragraph, Page 3-39).

34. Section 3.2.1, Page 3-38, Fourth Paragraph, First Sentence

The sentence implies that samples were previously collected from the Soil Vault Rows. Please summarize the information from these previous samples.

35. Section 3.2.6, Page 3-44

Coreholes C1 and C1A are only 34 feet apart at the surface yet 14 of 53 basalt flows and 2 of 8 sedimentary interbeds did not appear in both coreholes. This degree of heterogeneity creates a high degree of uncertainty with model predictions because preferential flow pathways may exist beneath the wastes that are unknown. There is also the fact that hydrogeologic characterization cannot occur beneath the waste and is limited even outside the pits and trenches. These varying degrees of uncertainty support the concept that further characterization, laboratory studies, and modeling are unlikely to reduce the predicted risk; a cause for remediation exists even if specific risk drivers may change with the acquisition of additional data.

36. Section 3.2.8, Page 3-46, First Bullet

Part of the text appears to be missing, please correct.

37. Section 3.2.8, Page 3-46, First Paragraph Following Bullets

Although one of the objectives of the selected remedy is to prevent drinking water standards from being exceeded, subsequent sampling and analysis of groundwater has shown some levels just above the MCLs. It should be mentioned that regardless of extraction efforts, contamination already exists that is beyond the current reach of the remedial effort and that this existing vadose zone contamination will continue to contribute to increased levels of carbon tetrachloride in the aquifer.

38. Section 3.2.8, Page 3-47, First and Second Paragraphs

Since OCVZ remediation was divided into three Phases, it would be extremely beneficial if the results of the second Phase (to-date) can be provided for review and comparison with Phase I result. In addition, it would be helpful to understand the differences (if any) of the goals/objectives of each Phase. Please provide the details of this Program.

39. Section 3.2.12, Page 3-53, Last Paragraph

To DEQ's knowledge, the NATS have not been used for several years for moisture front monitoring (if true please state when and why they were curtailed to close this issue). The horizontal lysimeter never worked correctly and was abandoned, therefore please provide a date when moisture monitoring ceased and a reason as to why it was discontinued. The document should clarify that the 2-year post RA review was conducted by IDEQ and EPA.

40. Section 3.3.2.1, Page 3-54, First Paragraph

We presume the updated inventory information is current as of the writing of this document. There will be a period of approximately three years before the draft RI/BRA is due. Please state if new inventory information will be acquired. Provide the administrative process of evaluating the "new" information against the established data. Provide further details on whether "ranking" will be used to weigh the impact against the assumptions made in the modeling efforts and in other uses of the inventory.
For instance, it is stated that the HDT revised the volatile organic inventories associated with the RFP-743 series sludge. Please describe the process that "drove" these revisions.

41. Section 3.3.2.3, Page 3-55

The section states the inventory has been revised for the volatile organic compounds found in the RFP 743 series sludge but it is not clear if the inventory for radionuclides found in the sludge has been revised to match the increase in volatile organics. Please add a brief discussion pertaining to this topic in this section.

42. Section 3.4.2.1, Page 3-58, Radionuclide Ecological Contaminants of Potential Concern, Table 3-7

Comparing the screening results in the current document to those in the preliminary screening (Hampton and Becker, 2000), it appears that two radionuclides were added that were not identified as COPCs in the preliminary screening. In addition, three radionuclides that were identified in the preliminary screening were eliminated based on the current screening criteria (Np-237, Po-210, and Zn-65). Eleven nuclides that exceeded the EBSL were eliminated because they had been "previously eliminated by DOSTOMAN modeling results based on the upper-bound inventory estimate (Hampton and Becker 2000, Table 3)." Elsewhere, it is stated (Section 6.6.3.2.2) that "the DOSTOMAN model apparently under-predicts surface concentrations between two and three orders of magnitude for some contaminants (Becker et al. 1998)." Given the uncertainty associated with this model, and the fact that the calculated soil concentrations of some of the nuclides are one to three orders of magnitude greater than the EBSLs, it would seem prudent to retain the eleven nuclides rather than screening them at this time.

43. Section 3.6.6, Page 3-77

Please correct the misspelling at the end of the third sentence.

44. Section 3.6.5, Page 3-78, Figure 3-12

The Figure is difficult to read; for instance, the "Current Pit 10" boundaries are not legible; the numbers within each block area are specific to the "WasteOScope"; it is assumed that the entire trapezoid shape is the west end of Pit 10; arrows are not dark enough.

45. Section 3.6.6, Page 3-81, Figure 3-13

Please provide a notation to the Figure that indicates that the numbers associated with the geometrical shapes refer to "WasteOScope" cross-references.

46. Section 3.6.7, Page 3-85, Third Paragraph and Figure 3-16, Page 3-86

The text in this paragraph discusses the probe location, "DU-08". Please add the location of this probe location to the Figure 3-16 or cross-reference the Figure that this "helpful" location can be found.

47. Section 3.6.7, Page 3-85 and Figure 3-16, Page 3-86

The text states the probe hole locations were based on geophysical surveys while the figure showing waste shipment locations suggests the probe holes were not placed in optimum locations. The data suggest the historical records are less accurate than the geophysical data with respect to locating areas of higher concentration of radionuclides of concern. Given the level of uncertainty evidenced by this disparity, it is not clear which data set or sets should be used for remedial actions. It is also not clear what additional data collection or surveys are needed to more accurately define the bounds of the contaminants that require remediation if specific technologies are targeted for specific wastes. Because a universal remedy would not face this dilemma, the Feasibility Study should address this issue.

48. Section 3.6.8, Page 3-89, Figure 3-17,

Please include in the legend a description for the gray circles shown on this figure.

49. Section 3.6.8, Page 3-90, First Paragraph, Sixth Sentence

The referenced footnote (footnote b) could not be found. Please correct the omission.

50. Section 3.6.12, Page 3-100

An additional bullet should be added to include calibration of the nuclear logging to downhole radioisotopes or calibration under controlled conditions such that the logging data can be more accurately interpreted.

51. Section 3.7, Page 3-105, Paragraph 2, also Table 3-20 on Page 3-104

The text and supporting table illustrates a hypothesis associated with the presence of EDTA in the SDA, the potential for enhanced mobility of the actinides. The EDTA greatly reduces the K_d for the actinides tested. The rationale presented in the text ties the sparse detections of actinides in the vadose zone to a lack of support for the hypothesis, which is accurate. Alternate conclusions also can be drawn that are not mentioned but are worthy of discussion. For instance, it is possible the EDTA created mobile fractions

and that those mobile fractions have migrated beyond the current monitoring points in the vadose zone but they have not been detected in the aquifer yet or have been detected sporadically. It is also possible the monitoring in the vadose zone is inadequate because migration in the vadose zone will be predominantly vertical and all vadose zone monitoring is offset and not beneath the waste. Evidence for the vertical movement with minimal lateral spreading was evident during the large-scale infiltration test conducted near the RWMC. In addition, Section 4.5.6 discusses the partitioning of select radionuclides on the ceramic porous cup and silica flour used in the suction lysimeters installed prior to 1999. The laboratory studies indicate "approximately 99.9% of the americium, 89% of the plutonium, 33% of the neptunium, and 3% of the uranium was (sic) retained in the ceramic." These laboratory studies, combined with the fact that the lysimeters are not installed beneath the waste but adjacent to the waste, suggest the data collected from the lysimeters installed prior to 1999 may not be representative of subsurface transport. It is recommended this discussion be expanded to more fully tie in additional uncertainties associated with the vadose zone data and alternate interpretations of the data.

52. Section 3.7, Page 3-107, Second Paragraph

The statement at the end of the paragraph, which concludes plutonium (V) is more representative of "the vadose zone environment," is contradictory to the statement on page 3-103. This states when "the solid-to-liquid ratio in experiments more closely resembled natural conditions in the vadose zone, plutonium (V) and plutonium (VI) were reduced to plutonium (IV)." Please clarify these statements for the condition noted.

53. Section 3.7, Page 3-107, Last Paragraph

Both the second and third sentence contains editorial errors: please correct.

54. Section 4.4, Page 4-19, First Paragraph

We wish to underscore the stated importance of implementing the quarterly sampling of the existing network to gather much-needed data in the upcoming multi-year period.

55. Section 4.5, Page 4-26, First Paragraph

The silica flour and the lysimeter ceramic cup issues related to the attenuation of selected radionuclides appear well established by the studies. To that end, please describe how DOE intends to integrate this knowledge with the future of the suction lysimeter analytical program. For instance, attenuation information suggests that the analytical results derived from a lysimeter equipped/constructed with silica flour and a ceramic cup should be routinely adjusted upwards to account for the attenuation mechanism. Please describe the intended plan to address this issue.

56. Section 4.5.6, Page 4-26

The uncertainties created by the sorption of select radionuclides on the porous ceramic cup of the suction lysimeters are not adequately incorporated into other parts of this document such as Section 3.7. Please provide additional discussion on these uncertainties more globally.

57. Section 4.5.6, Page 4-26, Second Paragraph

Section 4.5.6 describes limited laboratory studies of the partitioning of select radionuclides on the porous ceramic cup and silica flour used with suction lysimeter installation prior to 1999. The laboratory studies indicate "approximately 99.9% of the americium, 89% of the plutonium, 33% of the neptunium, and 3% of the uranium was retained in the ceramic." These laboratory studies combined with the fact that the lysimeters are not installed beneath the waste but adjacent to the waste suggests that little data may be available even with long term monitoring to adequately calibrate the models because flow is predominantly downward in the vadose zone. Arguments can be posed that better spatial representation is needed for key variables such as partition coefficients (K_d) for the interbeds where sorption can occur in the model but the final prediction is expected to result in an unacceptable cumulative risk.

58. Section 4.6.2.3.3, Page 4-33, Last Paragraph, Third Sentence

If the ceramic cup is retaining 99.9% of the americium, that is quite a bit more than a fraction of the AM-241 as stated in this sentence. Please rewrite the sentence.

59. Section 4.6.2.4, Page 4-34, Last Paragraph

It is acknowledged that the probable cross-contamination issue related to groundwater well installations during the time period specified (1972-1974) has merit that is based upon the evidence of early "hits," with only two isolated "hits" detected much later. Please describe the installation and sampling techniques/procedures that evoked this theory of contamination since the explanation provided in Section 4.5.5 provides a meager explanation of the drilling activity and only a mention of split samples for the sampling activity.

60. Section 4.6.3, Page 4-42, First Paragraph

Although no analyses have been provided for Americium-243, the text does not describe why no analyses have been performed (i.e., no test method exists or management chooses not to add the radioisotope to the list of analytes). Please clarify and explain if this radioisotope will be added in future sampling events.

61. Section 4.6.4.5, Page 4-50, Last Paragraph

As stated in various sections of this document, the authors have indicated that the possibility of other INEEL facilities influencing the SRPA groundwater regime beneath the SDA is extremely remote due to its relative location to the nearest facilities. Given this setting, please offer text that discusses additional (possible) avenues/ source(s) that may be contributing to the C-14 contamination in the SRPA, upgradient of the SDA.

62. Section 4.6.5, Page 4-51, Last Sentence

Please include the method detection limit for Cl-36 to complete the thought presented regarding the lack of detection of Cl-36 in the 15 wells sampled.

63. Section 4.6.5.1, Page 4-51

No information is provided that indicates Cl-36 will remain a target analyte for environmental monitoring or the fact that September and December 2001 samples were "outliers." Please explain.

64. Section 4.6.7.5, Page 4-67, Last Paragraph.

As previously stated in the comment for C-14, the Tritium (H-3) aquifer data upgradient of the SDA shows detectable concentrations of H-3. DEQ is in agreement that additional data is needed to define the source(s) of this concentration, and other aquifer contaminant(s) upgradient of the SDA. Please offer text that proposes how this may be accomplished in the near future.

65. Section 4.6.13.3.5, Page 4-87, First Paragraph

As presented in earlier comments, the ceramic cup low-bias issue affects the analytical results of selected constituents. Please discuss the multiplier/correction value for this radioisotope (and others that demonstrate to have been affected) in order to systematically adjust each measured value after each sampling/analysis event. Alternately, please discuss what measures will be implemented to modify the lysimeter itself (cup change-out, etc.) to promote the acquisition of representative samples in the future.

The previous texts (and this paragraph) describe the all-too-often scenario that laboratory analyses report detection of various constituents even though available sample volumes are inadequate to provide a confirmation analysis. Please provide an explanation (associated either with each constituent or as a global statement) that explains the measures DOE is taking to ensure sufficient sample volumes remain to run these confirmatory analyses.

Alternately, please discuss how a longer time period between sample (volume) collections may yield the desired quantity of fluid to provide the confirmatory task.

66. Section 4.6.13.5.1, Page 4-93, Table 4-63

The note at the end of the table is incorrect. Please delete the following sentence: "The RBCs for the aquifer do not apply to perched water samples, but are used here as a basis of comparison." DEQ does not make the distinction made in this statement.

67. Section 4.6.13.5.1, Page 4-93, Third Paragraph

Please refer to previous comment with sufficient sample volume (fluids).

68. Section 4.6.14, Page 4-113, Paragraph 2

The part of the first sentence in front of the "TIMS analysis" Requires editing.

69. Section 4.6.16, Page 4-118, General Comment

The SDA maps for other radioisotopes in this section are extremely helpful when reviewing the isotope, the sample point relative to the SDA perimeter, and the subsequent depths of influence. Please consider offering the same type of diagram for each of the constituents of concern since it graphically illustrates the text for each constituent very well (for example, Radium-226).

70. Section 4.6.17.3.1, Page 4-125

As mentioned previously, please offer an explanation of what the core sampling method consisted of and why it was a questionable procedure.

71. Section 4.6.18.3.3, Page 4-138, Figure 4-41

The Figure displays numerous "hits" of Tc-99 in 2000, yet the Figure noticeably depicts a lack of samples taken for the year 2001. With so many "hits" of this radioisotope previously, please explain why no samples were collected in subsequent quarters.

72. Section 4.6.18.3.4, Page 4-138, First Paragraph

The statement at the end of the paragraph regarding the application of the MCL to perched water samples is incorrect and should be deleted. The MCL does apply.

73. Section 4.8.1.3.3, Page 4-193, Second Paragraph, Second-last Sentence

It is unclear from this statement whether or not the OCVZ system remains in operation today or it has been shut down (for full rebound). Please clarify. It would also be helpful to note how long of a shut down period is required to accomplish full rebound.

74. Section 4.10.1, Page 4-212, Last paragraph

Please delete "a" from the next to last sentence for consistency.

75. Section 4.10.3, Page 4-216

The discussion of results of plutonium detections should be tempered with a brief discussion regarding the possible sorption of plutonium on the porous ceramic cups of the suction lysimeters. Please add a brief discussion about this uncertainty.

76. Section 4.10.4, Page 4-226, Last Paragraph

The text acknowledges the importance of continued, aggressive data acquisition of the vadose zone and aquifer beneath, and in the vicinity of the SDA. DEQ strongly supports this position, because the acquisition of this information is crucial to the selection of the remedy or remedies for the SDA.

77. Section 5.1.3, Page 5-6, Table 5-3

Please note the lack of a release mechanism applied to the Am-243 INEEL waste streams.

78. Section 5.2.4, Page 5-34, General Comment

This entire section was well thought-out and presented with a variety of worthy scenarios.

79. Section 5.2.4.3.2, Page 5-48, Figure 5-8 and Page 5-49, Last paragraph

The last sentence of the figure description incorrectly states that a "trough feature" leads to the southwest from the SDA. The trough actually leads to the southeast. The same mistake also is made in the paragraph noted on the second page. Please correct.

80. Table 5-17, Pages 5-110 and 5-111

This table compares simulated concentrations for the various COCs with observed ranges of concentrations for the same chemicals. For many of the COCs it is indicated that there are no analyses. Please explain why no analysis for these chemicals has been performed and if there is an intention to fill this data gap.

81. Section 5.2.5, Page 5-112, First Paragraph

DEQ strongly agrees with the differences between the IRA model and the Pre-Draft RI/BRA model and agrees with the newer approach assumptions and input parameters.

82. Section 5.2.6.3, Page 5-114, Plutonium Partition Coefficients

The document makes the argument that even though the low Kd simulations better match observed aquifer concentrations (compared to the base case); this is irrelevant because the predictions are still below the method detection limit. However, if one is attempting to match Pu detections, assuming the detections of Pu are valid, a lower Kd may be reasonable and performs as well (or better) at matching both aquifer and soil detections.

83. Section 5.2.6.4, Page 5-115, Plutonium Mobility Fractions

As with the partition coefficient sensitivity runs, if one acknowledges the validity of the Pu detections then, for matching soil detections at a minimum, some mobile fraction (however small) may be worthy of inclusion in the model. The agencies should discuss using a combination of a lower Kd and a very small mobile fraction.

84. Section 5.5, Page 5-142, First Paragraph

DEQ acknowledges the significant improvements of the modeling in the Pre-Draft RI/BRA compared to the IRA model. In addition, the suggestions made in the future activities of pages 5-145 and 5-146 should definitely be implemented.

85. Section 5.5, Pages 5-142 through 5-146

This summary is an excellent overview of this document. Probably the biggest uncertainty associated with this effort is the inability to calibrate either the source release model or the transport model. As a result, the modeling efforts are virtually all predictive. This shortcoming is exacerbated by the very long time frames needed to evaluate potential future risks from the contaminants. Some uncertainties are related to spatial aspects of the data collection from the subsurface and others are related to processes that control the release and mobility of the contaminants in the subsurface. It is obvious that the contaminants in the SDA pose an unacceptable future risk via the ground water pathway and that remedial action is called for to mitigate the risk. Further data collection will enhance our understanding of the processes controlling the release and transport of the contaminants but the temporal aspects of the factors controlling the release and transport make predictions of the time needed for data collection impossible.

86. Section 6, Page 6-1

In the context of investigating the SDA for determination of risk, it is extremely important to incorporate sound engineering and good scientific judgement, which can be accomplished by utilizing the concepts found in 10 CFR 61 and 40 CFR 191. These ARARs need to be incorporated into the baseline risk assessment.

87. Section 6.1, Page 6-1

The time frames described on this page may not be consistent with the time frames believed to be appropriate by the Program or EPA and should be verified.

88. Section 6.2.3, Pages 6-7 to 6-13, Quantification of Exposure

The residential exposure equations in this section are all based on adult exposure parameters. The parameters should be age-adjusted to include exposure of child receptors. References for developing age-adjusted factors include the U.S. EPA Standard Default Exposure Factors, the U.S. EPA Exposure Factors Handbook, and the EPA Region 9 Preliminary Remediation Goals.

89. Section 6.2.3.1, Page 6-7, Soil Ingestion

The residential body weight is given as 70 kg, and the incidental soil ingestion rate as 100 mg/day. These are both adult parameters; children have higher intakes of soil as well as lower body weights. Recommend utilizing age-adjusted factors.

90. Section 6.2.3.2, Page 6-9, Inhalation of Fugitive Dust

The residential body weight and inhalation rate are adult exposure parameters. Children have a lower inhalation rate, but a lower body weight, as well.

91. Section 6.2.3.3, Page 6-9, Inhalation of Volatiles

Recommend using age-adjusted exposure parameters.

92. Section 6.2.3.5, Page 6-10, Dermal Absorption of Organic Contaminants from Soil

Children have a higher surface area to volume ratio than adults do. Recommend using age adjusted exposure parameters.

93. Section 6.2.3.6, Page 6-11, Residential Groundwater Ingestion

Recommend using age-adjusted exposure parameters.

94. Section 6.2.3.7, Page 6-11, Residential Ingestion of Homegrown Produce

Recommend using age-adjusted exposure parameters.

95. Section 6.2.3.8, Page 6-12, Residential Dermal Absorption of Organic Contaminants in Groundwater

Recommend using age-adjusted exposure parameters.

96. Section 6.2.3.9, Page 6-13, Residential Inhalation of Volatiles from Indoor Use of Groundwater

Recommend using age-adjusted exposure parameters.

97. Section 6.3.1.4, Page 6-17, Tetrachloroethylene (perchloroethylene), fourth paragraph

The unit risk for this particular chemical should be 5.8E-07 $(\mu g/m^3)^{-1}$, rather than 5.8E-07 $(mg/m^3)^{-1}$.

98. Section 6.4.2, Page 6-24, Table 6-5, Page 6-25, and Table 6-6, Page 6-26

Risk from tetrachloroethylene is not included in this section, and Table 6-6 lists peak risk for tetrachloroethylene as NA. Presumably this is because IRIS does not currently list a slope factor or unit risk for this chemical. However, these values are listed in Section 6.3.1.4, and they are appropriate to use in this risk assessment. EPA has been reassessing this chemical since 1990, and the reassessment should be completed soon. It is expected that the slope factor and unit risk will not change significantly.

99. Section 6.4.2, Page 6-40, Estimates of the Potential Human Health Risk, First Paragraph

It is stated that total risk was not computed for chemical carcinogens because the "two chemical carcinogens, carbon tetrachloride and methylene chloride, are VOCs and were evaluated by scaling the IRA results." Cumulative risk for chemical carcinogens is an important value to present, regardless of the method used for its estimation. Tetrachloroethylene is a chemical carcinogen that needs to be assessed, as well.

100. Section 6.4.3, Figure 6-51, Page 6-57

Please correct the units shown for soil concentrations.

101. Section 6.4.3, Figure 6-66, Page 6-64

Please correct the units shown for nitrate concentrations.

102. Section 6.4.3, Figure 6-68, Page 6-65

Please correct the units shown for nitrate concentrations.

103. Section 6.4.3, Figure 6-70, Page 6-66

Please correct the units shown for nitrate concentrations.

104. Section 6.4.3, Figure 6-72, Page 6-67

Please correct the units shown for nitrate concentrations.

105. Table 6-8, Page 6-78, Human Health Uncertainty Factors

The use of cancer slope factors is listed as potentially overestimating risk, because slope factors are associated with 95% UCLs. Slope factors for nonradionuclide contaminants are based on an upper confidence bound on the slope of the dose-response curve, and their use is thus unlikely to underestimate risk. Slope factors for radionuclides, on the other hand, are maximum likelihood estimates, and their use represents a realistic estimate of risk, not a conservative estimate. This is an important distinction.

106. Table 6-8, Page 6-79, Human Health Uncertainty Factors

Nine contaminants were not evaluated because of inadequate toxicity or inventory information. Among these, there is adequate toxicity information for chloroform, toluene, trichloroethylene, 1,1,1-trichloroethane, and xylenes, so it is assumed that these were not evaluated because of inadequate inventory information. Also, it is not clear how eliminating eleven contaminants from the evaluation could result in risk overestimation.

107. Figures 6-83 through 6-86, Pages 6-81 through 6-83

The figures illustrating the risk under different plutonium mobility scenarios indicate that, for certain isotopes and for scenarios that result in as good a match to observed values as the base case, the predicted risk is significantly increased over the base case. This should be acknowledged in the text.

108. Section 6.5, General Comment

The narrative of the uncertainty section provides much general discussion but leaves the reader with few conclusions and statements as to the confidence in the base case results. Statements are made that the BRA provides realistic, yet conservative estimates of risk. Please indicate if this statement can be substantiated in the uncertainty discussion as it is currently written.

109. Section 6.5.3.2, Page 6-76 Quantitative Sensitivity Analysis

While the results of each sensitivity simulation are presented individually it would be desirable to include a narrative summary discussion of the significance of the analysis to interpretation of the base case results. Should the "base case" be modified? What data gaps were identified that have the greatest potential to influence the overall risk estimates?

110. Section 6.5.3.2.2, Page 6-82

This section presents sensitivity runs to evaluate the potential impact of a highly mobile fraction of plutonium as observed during laboratory studies. The sensitivity runs suggest an additive impact to the cumulative predicted risk that is already unacceptable for

radionuclides other than plutonium. This section rejects the predictions of plutonium concentrations because the values are well above any detected concentrations observed to date. The argument presented does not account for the lack of vadose zone monitoring beneath the waste nor the sorption capacity of the porous ceramic cups used on the suction lysimeters used prior to 1999 as described in Section 4.5.6. This section should include some discussion of uncertainty associated with the data collection techniques and the possibility that a highly mobile fraction of plutonium exists.

111. Section 6.6.5.2.1, Page 6-112, Current Scenario Results, and Tables 6-22 and 6-23, Page 6-113.

The table numbers and heading for the two tables on page 6-113 should be switched.

112. Section 7.1.1, Page 7-2, Fourth Paragraph

Please delete "in" from the first sentence for sentence readability.

113. Section 7.2, Page 7-8, First Paragraph, Fifth Sentence

DEQ would like to emphasize the importance of this statement. Continued monitoring of not only the probe locations, but routine (quarterly) groundwater monitoring is imperative in providing the necessary data to adequately implement the preferred remedial efforts to contain the COCs identified within this document.